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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/990,965	11/21/2001	Xiang Liu	LIU-4-4-8	3316

55169 7590 02/27/2006

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EXAMINER
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LEE, DAVID J

ART UNIT	PAPER NUMBER
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2633

DATE MAILED: 02/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	09/990,965		LIU ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	David Lee		2633	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 January 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,4-9 and 12-16 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-9,12-16 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 7-9, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao (US Patent No. 6,104,515) in view of Miyamoto et al. (US Pub. No. 2003/0002121 A1).

Regarding claims 1 and 9, Cao teaches a transmitter for use in an optical communication system (fig. 1), said transmitter comprising: a means for generating a stream of optical pulses in which alternate ones of such pulses have essentially orthogonal polarizations (e.g. – pulses 14 and 15 of fig. 1), and a means for modulating the phases of said optical pulses (phase modulator 26 of fig. 1) as a function of input data (via data from driver 40 of fig. 1) applied to said transmitter, thereby encoding said input data onto said stream of optical pulses (input data is output onto link 27 of fig. 1). Cao does not expressly disclose that the optical pulses are RZ optical pulses. However, examiner takes official notice that using an RZ format for optical pulses is well known in the art. It would have been obvious to a skilled artisan at the time of invention to have an RZ format for the optical pulses of Cao in order to provide easier bit clock recovery at the receiver. Cao does not expressly disclose that the modulating means is a Differential Phase Shift Keying modulator. However, DPSK modulation is well known in the art and that it is one of a plurality of modulation formats available to an artisan. For example, Miyamoto, from a similar field of endeavor, discloses an optical transmission system wherein the

binary optical pulses are phase modulated using a DPSK format (Abstract; fig. 1). A skilled artisan would have been motivated to use the DPSK modulation scheme of Miyamoto in order to asynchronously detect the modulated data transmitted from a transmitter during the data demodulation and to easily resolve phase ambiguities at a receiver, thereby simplifying the demodulation process. Therefore it would have been obvious to a skilled artisan at the time of invention to utilize DPSK modulation as indicated by Miyamoto in the system of Cao in order to have a simpler and cost-efficient receiver.

Regarding claims 7 and 15, the combined invention of Cao and Miyamoto teaches the limitations of claim 1 including an optical communication channel (29 of fig. 1 of Cao) for transmitting the phase modulated optical pulses from the transmitter to a remote receiver (although not shown, the receiver is inherent in the communication system of fig. 1).

Regarding claims 8 and 16, the combined invention of Cao and Miyamoto inherently teach a demodulator for recovering the input data (receivers comprise demodulators for data recovery).

3. Claims 4, 5, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Miyamoto and in further view of Hall et al. (US Pub. No. 2002/0003641 A1).

Regarding claims 4 and 12, Cao teaches a transmitter for use in an optical communication system (fig. 1), said transmitter comprising: a means for generating a stream of optical pulses in which alternate ones of such pulses have essentially orthogonal polarizations (e.g. – pulses 14 and 15 of fig. 1), and a means for modulating the phases of said optical pulses (phase modulator 26 of fig. 1) as a function of input data (via data from driver 40 of fig. 1) applied to said

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transmitter, thereby encoding said input data onto said stream of optical pulses (input data is output onto link 27 of fig. 1). Cao does not expressly disclose that the optical pulses are RZ optical pulses. However, examiner takes official notice that using an RZ format for optical pulses is well known in the art. It would have been obvious to a skilled artisan at the time of invention to have an RZ format for the optical pulses of Cao in order to provide easier bit clock recovery at the receiver. Cao does not expressly disclose that the modulating means is a Differential Phase Shift Keying modulator. However, DPSK modulation is well known in the art and that it is one of a plurality of modulation formats available to an artisan. For example, Miyamoto, from a similar field of endeavor, discloses an optical transmission system wherein the binary optical pulses are phase modulated using a DPSK format (Abstract; fig. 1). A skilled artisan would have been motivated to use the DPSK modulation scheme of Miyamoto in order to asynchronously detect the modulated data transmitted from a transmitter during the data demodulation and to easily resolve phase ambiguities at a receiver, thereby simplifying the demodulation process. Therefore it would have been obvious to a skilled artisan at the time of invention to utilize DPSK modulation as indicated by Miyamoto in the system of Cao in order to have a simpler and cost-efficient receiver. The combined invention of Cao and Miyamoto does not expressly disclose that the stream of RZ optical pulses are generated from a first and a second stream of RZ optical pulses in which pulses in said first stream have essentially orthogonal polarizations with respect to pulses in said second stream. Hall discloses a bit interleaved polarization division multiplexer (fig. 9), wherein a stream of RZ optical pulses is generated from a first and a second stream of RZ optical pulses (312 and 312' of fig. 9) in which pulses in said first stream have essentially orthogonal polarizations with respect to pulses in said

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second stream (318 of fig. 9). It would have been obvious to a skilled artisan at the time of invention to use the polarization division multiplexer of Hall (fig. 9 of Hall) for generating the optical pulses of Cao (14 and 15 of fig. 1 of Cao) in order to increase spectral efficiency and dispersion tolerance and to reduce timing jitter.

Regarding claims 5 and 13, the combined invention of Cao, Miyamoto, and Hall teaches that the first and second streams of optical pulses each have the same first wavelength (both come from source 304 of fig. 9 of Hall). The combined invention does not specifically disclose that the transmitter further includes a wavelength division multiplexer for combining the output of said modulation means with at least a second modulated optical signal having a wavelength different from said first wavelength. However, Examiner takes official notice that multiplexing modulated signals of different wavelengths is well known in the art. One of ordinary skill in the art would have been motivated to multiplex the two wavelengths together in order to increase transmission capacity. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate a WDM in the transmitter of Cao, Miyamoto, and Hall.

4. Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao in view of Miyamoto and Hall and in further view of Mollenauer (US Patent No. 4,881,790).

Regarding claims 6 and 14, the combined invention of Cao, Miyamoto and Hall teaches the limitations of claims 4 and 12 but does not expressly disclose that the pulses are solitons. However, solitons are extremely well known and widely used throughout the art. For example, Mollenauer teaches a soliton-based transmission system (fig. 1). It would have been obvious to

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a skilled artisan at the time of invention to use solitons in order to eliminate the need for dispersion compensation.

***Response to Arguments***

5. Applicant's arguments with respect to the claims have been considered but are moot in view of the new grounds of rejection.

6. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Lee whose telephone number is (571) 272-2220. The examiner can normally be reached on Monday - Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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**KENNETH VANDERPUYE**  
**SUPERVISORY PATENT EXAMINER**